REMARKS

Claims 1-18 are presented for examination and were pending in this application. In an Official Action dated March 2, 2007, claims 1-28 were rejected.

Applicants have amended claims 1, 4, 7, 10, 13 and 16 in order to more particularly define the invention. Applicants make no admission as to the patentability or unpatentability of the originally filed claims.

Based on the following Remarks, Applicants respectfully request that Examiner reconsider all outstanding rejections and withdraw them.

The Examiner rejected claims 1-15 and 17-18 under 35 USC § 102(b) as being anticipated by Chang et al. (PCT/US97/08266) ("Chang").

Claim 1 as amended recites:

A method of detecting at least one of a pan and a zoom in a video sequence, comprising:

selecting a set of frames from a video sequence;

determining a set of motion vectors for each frame in the set of frames;

determining a motion angle for each motion vector;

identifying at least two largest regions in each frame having motion vectors with substantially similar motion angles;

determining percentages of each frame covered by the at least two largest regions;

determining a statistical measure of the motion angles for at least one of the two largest regions; and

comparing the percentages and statistical measure to threshold values to identify at least one of a pan and a zoom in the video sequence.

The claimed method detects a pan or a zoom in a video sequence. A set of frames are selected from a video sequence and a set of motion vectors are determined for each frame in the set. A motion angle describing motion vector orientation is then determined for each motion vector. At least two largest regions in each frame having motion vectors with substantially similar motion angles are then identified, and the percentage of each frame covered by these largest regions is determined. A statistical measure of the motion angles for at least one of the identified largest regions is then computed and compared to threshold values to identify a pan or a zoom.

The claimed method thus provides a technique for detecting a pan or a zoom in a video sequence by using motion angles to identify at least two largest regions of each frame with substantially similar motion vector orientation. By computing motion angles, the claimed method identifies regions with similarly oriented motion vectors which allows pan or zoom detection without computing motion where most of the image points are uniformly displaced (i.e., computing global motion). Determining motion angles of each motion vector allows for rapid determination of regions of each frame where the motion vectors are substantially similarly oriented and identification of the largest regions of each frame with substantially similarly motion angles. Evaluating motion vectors in one of the largest regions, rather than for the entire frame, reduces the computation necessary for detecting a pan or a zoom in the frame. This beneficially improves the efficiency of pan or zoom detection.

Chang does not disclose "determining a motion angle for each motion vector," as claimed. Chang merely discloses detecting moving objects within a frame by identifying areas of a frame with motion vectors different than the non-moving areas of the frame (see page 17, lines 4-6). This detection merely compares motion vectors to a predeter-

mined threshold value to eliminate areas of the frame where motion vectors are below the predetermined threshold value (see page 17, line 8). In Chang, the motion vectors are generated by block matching, which finds a block in a reference frame, which minimizes prediction error (see page 14, lines 9-14). As part of this block matching, Chang uses an affine transform consisting of a linear transformation and a translation, to describe global motion of an entire frame rather than using motion angles to describe motion vector orientation (see Chang, page 14, lines 4-9).

Further, the results of the affine transformation are used to identify non-moving regions and moving regions of the frame, rather than regions with substantially different motion vector orientations. Hence, Chang fails to disclose "identifying at least two largest regions in each frame having motion vectors with substantially similar motion angles," as claimed. There is no indication that the threshold value disclosed in Chang accounts for the motion angle of each motion vector. Rather, the predetermined threshold determines the presence or absence of motion using the magnitude of the motion vector, regardless of the motion angle of the motion vector. Thus, the detection in Chang identifies regions with substantially different motion angles and motion vector magnitudes exceeding the predetermined threshold rather than identifies regions "having motion vectors with substantially similar motion angles." Further, Chang detects all regions with motion vectors exceeding the threshold value, not at least two largest regions of each frame with substantially similar motion angles. Therefore, Chang fails to disclose "identifying at least two largest regions in each frame having motion vectors with substantially similar motion angles," as claimed.

Accordingly, claim 1 is patentable over Chang.

Claims 7 and 13 similarly recite "determining a motion angle for each motion vector." Thus, claims 7 and 13 are patentable over Chang for at least the same reasons advanced above with respect to claim 1.

In addition to reciting their own patentable features, claims 2-6 depend from patentable claim 1, claims 8-12 depend from patentable claim 7, and claims 14-18 depend from patentable claim 13. Accordingly, each claim is also patentable.

The Examiner also rejected claim 16 as being obvious in view of Chang.

As claim 16 is dependent on claim 13, all arguments advanced above are also applicable to claim 16. In addition, the Official Notice relied upon by the Examiner does not overcome the deficiencies of Chang. The Official Notice merely indicates that polar coordinates are a form of mathematical representation. The Official Notice does not disclose "determining a motion angle for each motion vector." Thus, the combination of Chang and Official Notice fails to disclose the subject matter of claim 16.

Therefore, claim 16 is patentably distinct over the cited references, both alone and in combination, and the rejection should be withdrawn.

Should the Examiner wish to discuss the above amendments and remarks, or if the Examiner believes that for any reason direct contact with Applicants' representative would help to advance the prosecution of this case to allowance, the Examiner is invited to telephone the undersigned at the number given below.

Respectfully submitted,
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